

AWARD/CONTRACT		1. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 350)	RATING DO-A1	PAGE 1 OF 21
2. CONTRACT (Proc. Inst. Ident.) NO. NAS1-20274		3. EFFECTIVE DATE JUL 28 1994	4. REQUISITION/PURCHASE REQUEST/PROJECT NO. BAC.0602/BA.0394	
5. ISSUED BY	CODE	6. ADMINISTERED BY (If other than Item 5)		

National Aeronautics and Space Administration
Langley Research Center
Hampton, VA 23681-0001

Delegation Being Made Via
NASA Form 1430
Criticality Designator C

7. NAME AND ADDRESS OF CONTRACTOR (No., street, city, county, State and ZIP Code)		8. DELIVERY	
Northrop Grumman Advanced Technology and Design Center 8900 East Washington Blvd., Building 216 Pico Rivera, CA 90660-3783		<input type="checkbox"/> FOB ORIGIN <input type="checkbox"/> OTHER (See below)	
		9. DISCOUNT FOR PROMPT PAYMENT N/A	
10. SUBMIT INVOICES (4 copies unless otherwise specified) TO THE ADDRESS SHOWN IN:		ITEM Block 12	
CODE	FACILITY CODE		

11. SHIP TO/MARK FOR		12. PAYMENT WILL BE MADE BY	
NASA, LaRC NAS1-20274 Hampton, VA 23681	CODE Also see Exhibit A.	Financial Management Division, M/S 175 NASA, Langley Research Center Hampton, VA 23681-0001	
13. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION: <input type="checkbox"/> 10 U.S.C. 2304(c)(1) <input type="checkbox"/> 41 U.S.C. 253(c)(1)		14. ACCOUNTING AND APPROPRIATION DATA BAC.0602; R18961; \$92,000 (Complete) R14454; \$ 7,999 (Complete)	

15A. ITEM NO.	15B. SUPPLIES/SERVICES	15C. QUANTITY	15D. UNIT	15E. UNIT PRICE	15F. AMOUNT
	Integrated Natural Laminar Flow Design Concept for Efficient Supersonic Cruise			Firm Fixed Price	\$99,999

15G. TOTAL AMOUNT OF CONTRACT ▶ \$ 99,999

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CONTRACTING OFFICER WILL COMPLETE ITEM 17 OR 18 AS APPLICABLE

17. <input checked="" type="checkbox"/> CONTRACTOR'S NEGOTIATED AGREEMENT (Contractor is required to sign this document and return 3 copies to issuing office.) Contractor agrees to furnish and deliver all items or perform all the services set forth or otherwise identified above and on any continuation sheets for the consideration stated herein. The rights and obligations of the parties to this contract shall be subject to and governed by the following documents: (a) this award/contract, (b) the solicitation, if any, and (c) such provisions, representations, certifications, and specifications, as are attached or incorporated by reference herein. (Attachments are listed herein.)	18. <input type="checkbox"/> AWARD (Contractor is not required to sign this document.) Your offer on Solicitation Number _____ including the additions or changes made by you which additions or changes are set forth in full above, is hereby accepted as to the items listed above and on any continuation sheets. This award consummates the contract which consists of the following documents: (a) the Government's solicitation and your offer, and (b) this award/contract. No further contractual document is necessary.
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19A. NAME AND TITLE OF SIGNER (Type or print) R. H. Robie Manager Contracts & Pricing		20A. NAME OF CONTRACTING OFFICER SHARON A. HARPER	
19B. NAME OF CONTRACTOR BY <u>R. H. Robie</u> (Signature of person authorized to sign)	19C. DATE SIGNED 25 JUL 94	20B. UNITED STATES OF AMERICA BY <u>Sharon A. Harper</u> (Signature of Contracting Officer)	20C. DATE SIGNED 7-28-94

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PART I - THE SCHEDULE

SECTION B - SUPPLIES OR SERVICES AND PRICES/COSTS

B.1 SUPPLIES AND/OR SERVICES TO BE FURNISHED (NASA 18-52.210-72) (DEC 1988)

The Contractor shall provide all resources (except as may be expressly stated in this contract as furnished by the Government) necessary to furnish the required supplies and/or services in accordance with the Description/Specifications/Work Statement in Section C.

B.2 FIRM FIXED PRICE (NASA 18-52.216-78) (DEC 1988)

The total firm fixed price of this contract is \$99,999.

B.3 LEVEL OF EFFORT

A. In the performance of this contract, the Contractor shall furnish 1,256 direct productive labor hours of effort, exclusive of subcontracting/consulting hours, as defined in Paragraph B below.

B. Direct productive labor hours are defined as those hours expended by "technical personnel" in conducting the research studies. This does not include administrative and support personnel such as, financial, accounting, secretarial, clerical, procurement, etc., or any other labor allocated as indirect. Further, direct productive labor hours shall mean hours actually worked, excluding all leave (vacation, holidays, sick, etc.).

C. Employee time records on expenditure of the above direct productive labor hours shall be maintained. As a minimum, the records shall identify this research effort, the employee, job title, hours worked, date of performance and rate of pay. Performance of the work shall be evidenced by the signatures of the employee and an official of the firm. For any subcontracting and/or consulting work the same shall apply. The Government shall have the right to audit such records.

D. If upon contract completion, the Contractor has not provided the total direct labor hours as specified, the total fixed price of this contract shall be reduced by the product of the hours of unexpected labor multiplied by the burdened rate of \$75.36.

E. The Contractor may, at its own option, furnish more than the stated direct productive labor hours; however, the Contractor shall not be entitled to any increase in the fixed price of the contract.

F. Upon final invoicing and completion of the contract, the Contractor shall submit to the Contracting Officer a statement certifying the actual total number of direct productive labor hours expended under this contract.

SECTION C - DESCRIPTION/SPECIFICATIONS/WORK STATEMENT

C.1 STATEMENT OF WORK

Program Objectives

The technical problem to be addressed is the application of a Supersonic Natural Laminar Flow (SNLF) Wing Concept and Thermal Laminar Flow Control (TLFC) Technology to a commercial supersonic aircraft. The overall objective of the research program is to enable such an application by developing the required technology, validating the proposed concept, and reducing risk.

Specifically, the Research Analysis phase comprises two major objectives:

- Perform a multidisciplinary, systems-level design integration to identify benefits in terms of performance, weight, and costs.
- Define experimental and/or analytical research programs for risk reduction and concept validation.

Research Analysis Tasks

The following defines the tasks for this Research Analysis:

1.0 Identify assumptions and uncertainties in the design integration. Define Figures of Merit (FOM).

The basic ground rules of analysis, design, and comparison shall be established and documented. The Contractor shall ensure that the final benefit assessment is accurate and objective and shall identify any assessment uncertainties. Benefit assessment criteria shall be formulated jointly with NASA, by choosing a basis of comparison and FOM. A conventional supersonic commercial transport design shall be chosen for comparison. The assessment of each configuration shall be based on the same FOM.

Based on currently available design mission specifications, performance constraints, optimization parameters, engine data, stability and control criteria, configuration design criteria, and applicable Federal Aviation Regulations; assumptions regarding material breakdown, state-of-the-art weight reduction factors, passenger seating dimensions, etc., shall be performed and assessed. Design criteria and assumptions will be applied equally - to the extent practicable - to both the SNLF and conventional configurations. (The preferred conventional configuration for comparison is the Reference H High-Speed Civil Transport.)

2.0 Perform parametric vehicle sizing and identify "design drivers" and sensitivities.

2.1 Evaluate takeoff and landing performance; optimum cruise/climb performance; subsonic, transonic and supersonic cruise performance.

2.2 Determine takeoff gross weight, operating empty weight, and fuel weight.

2.3 Perform parametric tradeoff studies.

2.4 Assess benefits.

"Point" designs, including configuration integration, aerodynamic design, computational fluid dynamics, propulsion system integration, mass properties, structural design, and sub-systems shall be sized to meet mission requirements and performance constraints. Parametric sizing studies shall be carried out to investigate the effects of laminar flow coverage (with and without TLFC), wing planform, wing thickness, and leading-edge sweep on the FOM chosen in Task 1 (e.g., takeoff gross weight). Performance constraints (e.g., C_{Lmax} , P_s) shall be evaluated to determine which are "design drivers." The effect of configuration trades involving landing gear concepts, control surfaces and stabilizers (size and location), and engine installation concepts shall also be assessed using a sizing analysis.

The Reference H baseline conventional (turbulent) double delta configuration, shall be used for the sizing to ensure consistency between the result for conventional and SNLF configurations. In the end, a payoff assessment shall be made by comparing the FOM of supersonic transports configured with a conventional wing, an SNLF wing, and an SNLF wing with TLFC.

3.0 Identify and define approaches for follow-on risk reduction and concept validation.

3.1 Flight/ground tests.

3.2 Wind tunnel tests.

3.3 CFD analysis.

Further development of SNLF and TLFC technology and validation of the design concept will require significant levels of research. Empirical data will be required for more detailed design refinement and optimization, which, in turn, is necessary to more accurately ascertain the economic payoff of incorporating SNLF and TLFC. Specific issues that require further research and development efforts include (1) operational feasibility of extended natural laminar flow coverage, (2) subsonic flight at large negative static stability of a commercial aircraft, and (3) aeroelastic characteristics of a wing with a swept forward elastic axis.

An objective of future work will be to obtain longitudinal and directional characteristics of the Research Analysis configuration through wind tunnel testing and/or advanced CFD analysis. Low-speed, transonic, and supersonic aerodynamic characteristics are required to validate the design and its performance predictions throughout the flight envelop. In this task, suitable test sites will be chosen, a test matrix will be devised, and the characteristics of a test model will be decided. A first-order cost estimate for the model will be formulated and expectations in conducting the tests will be outlined. In addition, a program of design optimization based on the expected experimental data shall be developed. A plan to utilize advanced CFD analysis shall be formulated to resolve any significant configuration issues prior to wind tunnel model design and to fill in gaps in the test matrix.

The successful design of a supercruising NLF aircraft must be based on empirical knowledge of the practical limits of laminar flow coverage. In addition, boundary layer transition prediction codes must be validated and calibrated under realistic flight conditions. Consequently, there is a need for high Reynolds number testing of the SNLF wing concept with active wing cooling as an option. Since no wind tunnels currently exist which are capable of achieving the desired Reynolds number for laminar flow testing, approaches for flight testing and ground testing will be evaluated. Approaches to consider shall include, as a minimum to, flight testing a model SNLF wing atop a carrier vehicle (e.g., SR-71), re-winging a test vehicle (e.g., Pegasus, D-21), or mounting a model wing to a sled on a test track such as the Holloman High-Speed Test Track or Hurricane Mesa Test Track. The evaluation of each approach shall include feasibility studies and first-order cost appraisals. Test matrices shall be devised and include longitudinal and crossflow frequency/amplitude measurements, dynamic surface pressure data, and total pressure and temperature profiles in the boundary layer.

SECTION D - PACKAGING AND MARKING

D.1 PACKAGING AND MARKING (ALTERNATE I) (NASA 18-52.210-75) (SEP 1990)

(a) The Contractor shall preserve, pack, and mark for shipment all items deliverable under this contract in accordance with good commercial practices and adequate to ensure both acceptance by common carrier and safe transportation at the most economical rate(s).

(b) The Contractor's markings on shipping containers shall be clearly legible from a distance of 36 inches. The Contractor may mark by stencil, rubber stamp, or lacquer over a coated gummed label.

(c) The Contractor shall place identical requirements on all subcontracts.

SECTION E - INSPECTION AND ACCEPTANCE

E.1 FINAL INSPECTION AND ACCEPTANCE (LARC 52.246-94) (OCT 1992)

Final inspection and acceptance of all items specified for delivery under this contract shall be accomplished by the Contracting Officer or his duly authorized representative at destination.

SECTION F - DELIVERIES OR PERFORMANCE

F.1 PERIOD OF PERFORMANCE (NASA 18-52.212-74) (DEC 1988)

The period of performance of this contract shall be seven months from the effective date of this contract.

F.2 PLACE(S) OF PERFORMANCE (LARC 52.212-98) (OCT 1992)

The place(s) of performance shall be the Contractor's facility located in Pico Rivera, California.

F.3 ORAL PRESENTATIONS (LARC 52.212-100) (AUG 1991)

The Contractor shall make oral presentations under this contract at the approximate times and locations identified below:

<u>Months from Effective Date of Contract</u>	<u>Location</u>
1. Within 30 days after the effective date of the contract	NASA, LaRC Hampton, Virginia
2. At the completion of the effort, no later than seven months after the effective date of the contract	NASA, LaRC Hampton, Virginia

The specific dates of the presentations shall be mutually selected by the Contracting Officer and the Contractor. The presentation(s) shall include a review of all work accomplished during contract performance. The presentations, shall also include a brief summary of reportable items under the Section I clause entitled "New Technology."

SECTION G - CONTRACT ADMINISTRATION DATA

G.1 DESIGNATION OF NEW TECHNOLOGY REPRESENTATIVE AND PATENT REPRESENTATIVE (NASA 18-52.227-72) (APR 1984)

(a) For purposes of administration of the clause of this contract entitled "New Technology" or "Patent Rights - Retention by the Contractor (Short Form)", whichever is included, the following named representatives are hereby designated by the Contracting Officer to administer such clause:

<u>Title</u>	<u>Office Code</u>	<u>Address (including zip code)</u>
New Technology Representative	200	NASA, Langley Research Center Hampton, VA 23681-0001
Patent Representative	143	NASA, Langley Research Center Hampton, VA 23681-0001

(b) Reports of reportable items, and disclosure of subject inventions, interim reports, final reports, utilization reports, and other reports required by the clause, as well as any correspondence with respect to such matters, should be directed to the New Technology Representative unless transmitted in response to correspondence or request from the Patent Representative. Inquiries or requests regarding disposition of rights, election of rights, or related matters should be directed to the Patent Representative. This clause shall be included in any subcontract hereunder requiring a "New Technology" clause or "Patent Rights - Retention by the Contractor (Short Form)" clause, unless otherwise authorized or directed by the Contracting Officer. The respective responsibilities and authorities of the above-named representatives are set forth in 18-27.375-3 of the NASA FAR Supplement.

G.2 PAYMENT (LaRC 52.232-90) (APR 1993)

Payment of the contract price will be made after delivery and acceptance of all deliverable items and the completion of all contractual requirements. Partial payments will not be authorized.

G.3 PAYMENT ADDRESS (LaRC 52.232-93) (JUN 1988)

A. In accordance with the "Prompt Payment" clause, if payment is made by check, the address to which payment should be sent is:

Northrop Grumman Corporation
Attn: D. Johnson, B217/MI
8900 East Washington Boulevard
Pico Rivera, CA 90660-3737

B. If payment is made by electronic funds transfer, payment will be forwarded to the financial institution and account identified in the TFS Form 3881 executed by the Contractor.

G.4 INVOICING (LaRC 52.232-95) (JUN 1988)

Proper invoices, as determined under the Section I clause entitled "Prompt Payment," shall be submitted to the designated payment office shown in Block 25 on page 1 of this contract.

G.5 GOVERNMENT-FURNISHED ITEMS (LaRC 52.245-92) (JUN 1988)

For the performance of this contract, the Government will furnish to the Contractor those items specified in below, in the form of reports, computer data files, or E-mail, as necessary.

- A. Available Published Reports and Data.
- B. Numerical Prediction Methodology currently available.
- C. Available Commerical Aircraft Design Criteria.
- D. Available Data necessary to establish appropriate wind tunnel and flight test program(s).

SECTION H - SPECIAL CONTRACT REQUIREMENTS

H.1 RIGHTS TO PROPOSAL DATA (TECHNICAL) (FAR 52.227-23) (JUN 1987)

Except for data contained on pages 1, 2, 4, 5 and 8, it is agreed that as a condition of award of this contract, and notwithstanding the conditions of any notice appearing thereon, the Government shall have unlimited rights (as defined in the "Rights in Data - General" clause contained in this contract) in and to the

technical data contained in the proposal dated February 28, 1994 as updated by July 12, 1994 FAX, upon which this contract is based.

H.2 KEY PERSONNEL AND FACILITIES (NASA 18-52.235-71) (MAR 1989)

(a) The personnel and/or facilities listed below (or specified in the Contract Schedule) are considered essential to the work being performed under this contract. Before removing, replacing, or diverting any of the listed or specified personnel or facilities, the Contractor shall (1) notify the Contracting Officer reasonably in advance and (2) submit justification (including proposed substitutions) in sufficient detail to permit evaluation of the impact on this contract.

(b) The Contractor shall make no diversion without the Contracting Officer's written consent; provided, that the Contracting Officer may ratify in writing the proposed change, and that ratification shall constitute the Contracting Officer's consent required by this clause.

(c) The list of personnel and/or facilities (shown below or as specified in the Contract Schedule) may, with the consent of the contracting parties, be amended from time to time during the course of the contract to add or delete personnel and/or facilities.

Heinz Gerhardt
Berry Gibson
E. R. Yap

H.3 INCORPORATION OF REPRESENTATIONS AND CERTIFICATIONS BY REFERENCE

Pursuant to FAR 15.406-1(b), the completed Representations and Certifications dated July 25, 1994 is hereby incorporated herein by reference.

H.4 ADVANCE APPROVAL FOR RELEASE OF TECHNICAL INFORMATION (LaRC 52.227-92) (OCT 1993)

The Contractor shall not release technical information based on or containing data first produced in the performance of this contract and describing the work performed under this contract unless prior written approval is given by NASA. The Contractor shall submit technical information regarding the contract effort, such as journal articles, meeting papers, and technical documents, to the Contracting Officer Technical Representative (COTR) for review and concurrence with subsequent approval by the cognizant NASA Headquarters Program Office prior to establishing claim to copyright, publication, presentation, or release to others. The Contractor may proceed upon receipt of written concurrence by the COTR as though approval also had been received from the cognizant NASA Headquarters Program Office, unless directed otherwise in the COTR concurrence letter.

PART II - CONTRACT CLAUSES

SECTION I - CONTRACT CLAUSES

I.1 LISTING OF CLAUSES INCORPORATED BY REFERENCE:

NOTICE: The following solicitation provisions and/or contract clauses pertinent to this section are hereby incorporated by reference.

FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1) CLAUSES

<u>CLAUSE NUMBER</u>	<u>TITLE AND DATE</u>
52.202-1	Definitions (SEP 1991)
52.203-1	Officials Not to Benefit (APR 1984)
52.203-3	Gratuities (APR 1984)
52.203-5	Covenant Against Contingent Fees (APR 1984)
52.203-6	Restrictions on Subcontractor Sales to the Government (JUL 1985)
52.203-7	Anti-Kickback Procedures (OCT 1988)
52.203-10	Price or Fee Adjustment for Illegal or Improper Activity (SEP 1990)
52.209-6	Protecting the Government's Interest when Subcontracting with Contractors Debarred, Suspended, or Proposed for Debarment (NOV 1992)
52.210-5	New Material (APR 1984)
52.212-8	Defense Priority and Allocation Requirements (SEP 1990)
52.212-13	Stop-Work Order (AUG 1989)
52.215-1	Examination of Records by Comptroller General (FEB 1993)
52.215-2	Audit - Negotiation (FEB 1993)
52.215-26	Integrity of Unit Prices (APR 1991)
52.215-33	Order of Precedence (JAN 1986)
52.219-8	Utilization of Small Business Concerns and Small Disadvantaged Business Concerns (FEB 1990)
52.219-13	Utilization of Women-Owned Small Businesses (AUG 1986)
52.220-3	Utilization of Labor Surplus Area Concerns (APR 1984)
52.222-1	Notice to the Government of Labor Disputes (APR 1984)
52.222-3	Convict Labor (APR 1984)
52.222-26	Equal Opportunity (APR 1984)
52.222-35	Affirmative Action for Special Disabled and Vietnam Era Veterans (APR 1984)
52.222-36	Affirmative Action for Handicapped Workers (APR 1984)
52.222-37	Employment Reports on Special Disabled Veterans and Veterans of the Vietnam Era (JAN 1988)
52.223-2	Clean Air and Water (APR 1984)
52.223-6	Drug-Free Workplace (JUL 1990)
52.225-3	Buy American Act - Supplies (JAN 1994)
52.225-11	Restrictions on Certain Foreign Purchases (MAY 1992)
52.227-1	Authorization and Consent (APR 1984) Alternate I (APR 1984)
52.227-2	Notice and Assistance Regarding Patent and Copyright Infringement (APR 1984)

52.227-11	Patent Rights - Retention by the Contractor (Short Form) (JUN 1989)--as modified by NASA FAR Supplement 18-52.227-11
52.227-14	Rights in Data - General (JUN 1987) -- as modified by NASA FAR Supplement 18-52.227-14
52.227-16	Additional Data Requirements (JUN 1987)
52.229-3	Federal, State and Local Taxes (JAN 1991)
52.229-5	Taxes - Contracts Performed in U.S. Possessions or Puerto Rico (APR 1984)
52.232-2	Payments under Fixed-Price Research and Development Contracts (APR 1984)
52.232-9	Limitation on Withholding of Payments (APR 1984)
52.232-17	Interest (JAN 1991)
52.232-23	Assignment of Claims (JAN 1986)
52.232-28	Electronic Funds Transfer Payment Methods (APR 1989)--as modified by NASA FAR Supplement 18-32.908
52.233-1	Disputes (MAR 1994) Alternate I (DEC 1991)
52.233-3	Protest After Award (AUG 1989)
52.243-1	Changes - Fixed-Price (AUG 1987) Alternate V (APR 1984)
52.244-5	Competition in Subcontracting (APR 1984)
52.245-2	Government Property (Fixed-Price Contracts) (DEC 1989) Alternate I (APR 1984)
52.246-9	Inspection of Research and Development (Short Form) (APR 1984)
52.246-16	Responsibility for Supplies (APR 1984)
52.249-1	Termination for Convenience of the Government (Fixed-Price) (Short Form) (APR 1984)
52.249-9	Default (Fixed-Price Research and Development) (APR 1984)
52.253-1	Computer Generated Forms (JAN 1991)

NASA FAR SUPPLEMENT (48 CFR CHAPTER 18) CLAUSES

<u>CLAUSE NUMBER</u>	<u>TITLE AND DATE</u>
18-52.208-81	Restrictions on Printing and Duplicating (AUG 1993)
18-52.212-70	Notice of Delay (DEC 1988)
18-52.219-76	NASA Small Disadvantaged Business Goal (JUL 1991)
18-52.227-70	New Technology (APR 1988)
18-52.235-70	Center for Aerospace Information (NOV 1992)
18-52.245-70	Acquisition of Centrally Reportable Equipment (MAR 1989)

I.2 CLAUSES IN FULL TEXT

The clauses listed below follow in full text:

52.252-2	Clauses Incorporated by Reference (JUN 1988)
52.232-25	Prompt Payment (MAR 1994)
52.242-13	Bankruptcy (APR 1991)

I.3 CLAUSES INCORPORATED BY REFERENCE (FAR 52.252-2) (JUN 1988)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available.

I.4 PROMPT PAYMENT (FAR 52.232-25) (MAR 1994)

Notwithstanding any other payment clause in this contract, the Government will make invoice payments and contract financing payments under the terms and conditions specified in this clause. Payment shall be considered as being made on the day a check is dated or an electronic funds transfer is made. Definitions of pertinent terms are set forth in 32.902. All days referred to in this clause are calendar days, unless otherwise specified.

(a) *Invoice Payments.*

(1) For purposes of this clause, "invoice payment" means a Government disbursement of monies to a Contractor under a contract or other authorization for supplies or services accepted by the Government. This includes payments for partial deliveries that have been accepted by the Government and final cost or fee payments where amounts owed have been settled between the Government and the Contractor.

(2) Except as indicated in subparagraph (a)(3) and paragraph (c) of this clause, the due date for making invoice payments by the designated payment office shall be the later of the following two events:

(i) The 30th day after the designated billing office has received a proper invoice from the Contractor.

(ii) The 30th day after Government acceptance of supplies delivered or services performed by the Contractor. On a final invoice where the payment amount is subject to contract settlement actions, acceptance shall be deemed to have occurred on the effective date of the contract settlement. However, if the designated billing office fails to annotate the invoice with the actual date of receipt, the invoice payment due date shall be deemed to be the 30th day after the date the Contractor's invoice is dated, provided a proper invoice is received and there is no disagreement over quantity, quality, or Contractor compliance with contract requirements.

(3) The due date on contracts for meat, meat food products, or fish; contracts for perishable agricultural commodities, contracts for dairy products, edible fats or oils, and food products prepared from edible fats or oils, and contracts not requiring submission of an invoice shall be as follows:

(i) The due date for meat and meat food products, as defined in Section 2(a)(3) of the Packers and Stockyard Act of 1921 (7 U.S.C. 182(3)) and further defined in Pub. L. 98-181 to include any edible fresh or frozen poultry meat, any perishable poultry meat food product, fresh eggs, and any perishable egg product, will be as close as possible to, but not later than, the 7th day after product delivery.

(ii) The due date for fresh or frozen fish, as defined in Section 204(3) of the Fish and Seafood Promotion Act of 1986 (16 U.S.C. 4003(3)), will be as close as possible to, but not later than, the seventh day after product delivery.

(iii) The due date for perishable agricultural commodities, as defined in section 1(4) of the Perishable Agricultural Commodities Act of 1930 (7 U.S.C. 499a(44)), will be as close as possible to, but not later than, the 10th day after product delivery, unless another date is specified in the contract.

(iv) The due date for dairy products, as defined in section 111(e) of the Dairy Production Stabilization Act of 1983 (7 U.S.C. 4502(e)), edible fats or oils, and food products prepared from edible fats or oils, will be as close as possible to, but not later than, the 10th day after the date on which a proper invoice has been received.

(v) If the contract does not require submission of an invoice for payment (e.g., periodic lease payments), the due date will be as specified in the contract.

(4) An invoice is the Contractor's bill or written request for payment under the contract for supplies delivered or services performed. An invoice shall be prepared and submitted to the designated billing office specified in the contract. A proper invoice must include the items listed in subdivisions (a)(4)(i) through (a)(4)(viii) of this clause. If the invoice does not comply with these requirements, then the Contractor will be notified of the defect within 7 days after receipt of the invoice at the designated billing office (3 days for meat, meat food products, or fish, and 5 days for perishable agricultural commodities, edible fats or oils, and food products prepared from edible fats or oils). Untimely notification will be taken into account in the computation of any interest penalty owed the Contractor in the manner described in subparagraph (a)(6) of this clause.

(i) Name and address of the Contractor.

(ii) Invoice date.

(iii) Contract number or other authorization for supplies delivered or services performed (including order number and contract line item number).

(iv) Description, quantity, unit of measure, unit price, and extended price of supplies delivered or services performed.

(v) Shipping and payment terms (e.g., shipment number and date of shipment, prompt payment discount terms). Bill of lading number and weight of shipment will be shown for shipments on Government bills of lading.

(vi) Name and address of Contractor official to whom payment is to be sent (must be the same as that in the contract or in a proper notice of assignment).

(vii) Name (where practicable), title, phone number and mailing address of person to be notified in event of a defective invoice.

(viii) Any other information or documentation required by other requirements of the contract (such as evidence of shipment).

(5) An interest penalty shall be paid automatically by the Government, without request from the Contractor, if payment is not made by the due date and the conditions listed in subdivisions (a)(5)(i) through (a)(5)(iii) of this clause are met, if applicable.

(i) A proper invoice was received by the designated billing office.

(ii) A receiving report or other Government documentation authorizing payment was processed and there was no disagreement over quantity, quality, or Contractor compliance with any contract term or condition.

(iii) In the case of a final invoice for any balance of funds due the Contractor for supplies delivered or services performed, the amount was not subject to further contract settlement actions between the Government and the Contractor.

(6) The interest penalty shall be at the rate established by the Secretary of the Treasury under section 12 of the Contract Disputes Act of 1978 (41 U.S.C. 611) that is in effect on the day after the due date, except where the interest penalty is prescribed by other governmental authority. This rate is referred to as the "Renegotiation Board Interest Rate," and it is published in the *Federal Register* semiannually on or about January 1 and July 1. The interest penalty shall accrue daily on the invoice payment amount approved by the Government and be compounded in 30-day increments inclusive from the first day after the due date through the payment date. That is, interest accrued at the end of any 30-day period will be added to the approved invoice payment amount and be subject to

interest penalties if not paid in the succeeding 30-day period. If the designated billing office failed to notify the Contractor of a defective invoice within the periods prescribed in paragraph (a)(4) of this clause, then the due date on the corrected invoice will be adjusted by subtracting the number of days taken beyond the prescribed notification of defects period. Any interest penalty owed the Contractor will be based on this adjusted due date. Adjustments will be made by the designated payment office for errors in calculating interest penalties, if requested by the Contractor.

(i) For the sole purpose of computing an interest penalty that might be due the Contractor, Government acceptance shall be deemed to have occurred constructively on the 7th day (unless otherwise specified in this contract) after the Contractor delivered the supplies or performed the services in accordance with the terms and conditions of the contract, unless there is a disagreement over quantity, quality, or contractor compliance with a contract provision. In the event that actual acceptance occurs within the constructive acceptance period, the determination of an interest penalty shall be based on the actual date of acceptance. The constructive acceptance requirement does not, however, compel Government officials to accept supplies or services, perform contract administration functions, or make payment prior to fulfilling their responsibilities.

(ii) The following periods of time will not be included in the determination of an interest penalty:

(A) The period taken to notify the Contractor of defects in invoices submitted to the Government, but this may not exceed 7 days (3 days for meat, meat food products, or fish, and 5 days for perishable agricultural commodities, dairy products, edible fats or oils, and food products prepared from edible fats or oils).

(B) The period between the defects notice and resubmission of the corrected invoice by the Contractor.

(iii) Interest penalties will not continue to accrue after the filing of a claim for such penalties under the clause at 52.233-1, Disputes, or for more than 1 year. Interest penalties of less than \$1.00 need not be paid.

(iv) Interest penalties are not required on payment delays due to disagreement between the Government and Contractor over the payment amount or other issues involving contract compliance or on amounts temporarily withheld or retained in accordance with the terms of the contract. Claims involving disputes, and any interest that may be payable, will be resolved in accordance with the clause at 52.233-1, Disputes.

(7) An interest penalty shall also be paid automatically by the designated payment office, without request from the Contractor, if a discount for prompt payment is taken improperly. The interest penalty will be calculated as described in subparagraph (a)(6) of this clause on the amount of discount taken for the period beginning with the first day after the end of the discount period through the date when the Contractor is paid.

(8) If this contract was awarded on or after October 1, 1989, a penalty amount, calculated in accordance with regulations issued by the Office of Management and Budget, shall be paid in addition to the interest penalty amount if the Contractor -

(i) Is owed an interest penalty;

(ii) Is not paid the interest penalty within 10 days after the date the invoice amount is paid; and

(iii) Makes a written demand, not later than 40 days after the date the invoice amount is paid, that the agency pay such a penalty.

(b) *Contract Financing Payments.*

(1) For purposes of this clause, "contract financing payment" means a Government disbursement of monies to a Contractor under a contract clause or other authorization prior to acceptance of supplies or services by the Government. Contract financing payments include advance payments, progress payments based on cost under the clause at 52.232-16, Progress Payments, progress payments based on a percentage or stage of completion (32.102(e)(1)) other than those made under the clause at 52.232-5, Payments Under Fixed-Price Construction Contracts, or the clause at 52.232-10, Payments Under Fixed-Price Architect-Engineer Contracts, and interim payments on cost type contracts.

(2) For contracts that provide for contract financing, requests for payment shall be submitted to the designated billing office as specified in this contract or as directed by the Contracting Officer. Contract financing payments shall be made on the 30th day after receipt of a proper contract financing request by the designated billing office. In the event that an audit or other review of a specific financing request is required to ensure compliance with the terms and conditions of the contract, the designated payment office is not compelled to make payment by the due date specified.

(3) For advance payments, loans, or other arrangements that do not involve recurrent submissions of contract financing requests, payment shall be made in accordance with the corresponding contract terms or as directed by the Contracting Officer.

(4) Contract financing payments shall not be assessed an interest penalty for payment delays.

(c) If this contract contains the clause at 52.213-1, Fast Payment Procedure, payments will be made within 15 days after the date of receipt of the invoice.

I.5 BANKRUPTCY (FAR 52.242-13) (APR 1991)

In the event the Contractor enters into proceedings relating to bankruptcy, whether voluntary or involuntary, the Contractor agrees to furnish, by certified mail, written notification of the bankruptcy to the Contracting Officer responsible for administering the contract. This notification shall be furnished within five days of the initiation of the proceedings relating to bankruptcy filing. This notification shall include the date on which the bankruptcy petition was filed, the identity of the court in which the bankruptcy petition was filed, and a listing of Government contract numbers and contracting offices for all Government contracts against which final payment has not been made. This obligation remains in effect until final payment under this contract.

PART III - LIST OF DOCUMENTS, EXHIBITS AND OTHER ATTACHMENTS

SECTION J - LIST OF ATTACHMENTS

- Exhibit A Contract Documentation Requirements, 2 pages
- Exhibit B Procedures for the Preparation and Approval of Contractor
Reports for Langley Research Center, Form PROC./P-72,
May 1992, 4 pages

EXHIBIT A - CONTRACT DOCUMENTATION REQUIREMENTS

I. DOCUMENTATION PREPARATION/SUBMISSION INSTRUCTIONS

A. Monthly Technical Letter Progress Report--The Contractor shall submit monthly technical letter reports describing progress of the program to date, noting all technical areas in which effort is being directed and indicating the status of work within these areas. Reports shall be in narrative form, brief and informal in content. These reports shall include:

1. A narrative statement of work accomplished during the report period
2. A statement of current and potential problem areas and proposed corrective action
3. A discussion of work to be performed during the next report period

The monthly progress report shall be submitted within 10 days after the end of each calendar monthly report period. A monthly progress report shall not be required for the period in which the final report is due. This submittal shall be subject to the provisions of the Section I clause entitled "Production Progress Reports."

B. Final Report--The Contractor shall submit a final report which documents and summarizes the results of the entire contract work. The final report shall include tables, graphs, diagrams, curves, sketches, photographs and drawings in sufficient detail to explain comprehensively the results achieved under the contract. The final report shall be submitted to the Contracting Officer in accordance with the instructions contained in Exhibit B, Procedures for the Preparation and Approval of Contractor Reports for Langley Research Center, Form PROC./P-72. The Contractor shall submit the required approval copies of the final report seven months from the effective date of this contract.

C. Federal Contractor Veterans Employment Report--In compliance with Clause 52.222-37, Employment Reports on Special Disabled Veterans and Veterans of the Vietnam Era, the Contractor shall submit the Federal Contractor Veterans Employment Report (VETS-100) as required by this clause.

II. DOCUMENT DISTRIBUTION REQUIREMENTS

A. Unless otherwise specified elsewhere in this contract, reports and other documentation shall be submitted f.o.b. destination as specified below, addressed as follows:

National Aeronautics and Space Administration
Langley Research Center
Attn: _____, Mail Stop _____
Contract NAS1-20274
Hampton, VA 23681-0001

B. The following letter codes designate the recipients of reports and other documentation which are required to be delivered to Langley Research Center by the Contractor:

A--Contract Administrator, Mail Stop 126

B--Contracting Officer Technical Representative, Mail Stop 406

C--New Technology Representative, Mail Stop 200

D--Patent Counsel, Mail Stop 143

E--According to Instructions on Form

C. The following are the distribution requirements for reports and other documentation required to be delivered f.o.b. destination. The numeral following the letter code specifies the number of copies to be provided:

<u>DOCUMENT</u>	<u>LETTER CODE AND DISTRIBUTION</u>
Monthly Progress Report	A-1, B-2, C-1
New Technology or Patent Rights Report	A-1, B-2, C-1, D-1
Oral Presentation Materials	B-1
Federal Contractor Veterans Employment Report (VETS-100)	E-1
Final Report (Approval Copies)	A-5
Final Report (Approved)	As specified by the Contracting Officer

D. When the Contract Administrator (A) is not designated above to receive a copy of a report or document, the Contractor shall furnish a copy of the report/document transmittal letter to the Contract Administrator.

by offset printing. Suggestions for preparing acceptable copy are given in NASA SP-7047. The original manuscript should not be bound and should have consecutive page numbers added in proper sequence. Odd numbered pages are numbered at the bottom of the page on the right; even, on the left. To avoid damage in handling and shipping, the original manuscript should be carefully packaged.

DISTRIBUTION AND DUPLICATION. - From the review made at the Langley Research Center, the Contracting Officer will make a determination concerning publication and distribution, which the Contractor shall complete within thirty (30) days after receipt of approval copies.

1. If NASA Langley Research Center considers that the report should be distributed only in limited quantities, the Contractor shall be requested to prepare duplicates of the original manuscript and distribute the original manuscript and copies (not to exceed 100¹) in accordance with a distribution list supplied by the Contracting Officer. In this case, the report will be assigned a number in the NASA CR high-numbered series (CR number above 50,000) by the Contracting Officer. When necessary, the Contractor will be provided with any notices to be added to the cover concerning distribution limitations.

2. If the NASA Langley Research Center considers the report of such quality or interest that it warrants wide distribution, it will be recommended to NASA Headquarters for publication in the NASA CR low-numbered series, and the Contractor will be requested to forward the original manuscript, together with up to 25² duplicate copies to Langley Research Center addresses furnished by the Contracting Officer. At the direction of the Contracting Officer, advance distribution by the Center may be made to those having a need to know. Printing from the original manuscript for final distribution will be provided by NASA. NASA will include the CR number on the cover and provide the author(s) with 10 copies each of the final printed report. (Author(s) will not receive 10 copies each of restricted distribution reports.)

PRINTING STANDARDS. - To comply with NASA printing requirements and cost considerations, reports submitted should conform to the following standards. Any questions regarding implementation of these standards should be directed to the Langley Printing Management Officer (LPMO) at (804) 864-3284.

1. Multiple-copy production shall be by the offset duplicating method, except as described in subparagraphs 1a and 1b below.

- a. Production may be on office copying machines or on diazo equipment when the number of copies is so small that such production is more economical than offset duplicating. However, the images will be clearly legible and permanent.

¹See Clause 18-52.208-81, Printing and Duplicating, for more detailed guidance.

b. Any image that cannot be accommodated by a foldout (as described in paragraph 2 herein) will be produced by the diazo or electrostatic method in a size dictated by legibility requirements.

2. The page image size of cover and text pages including headings will not exceed 7 1/8 x 9 1/8 inches. Page image including page number will not exceed 7 1/8 x 10 inches. Diagrams, charts, drawings, etc., shall be reduced and, if necessary, run broadside to eliminate oversized pages. If such reduction is too great for legibility, the subject will be split and run on two facing pages or run as a foldout with an image not larger than 14 x 9 1/2 inches.

3. Text and foldout pages will be on either of two paper stocks:

a. Offset book paper, white, substance 50 lbs. (basis 25 x 38/1000 sheets, Joint Committee on Printing (JCP) A60).

b. Chemical wood writing paper, white or colored, substance 20 lbs. (basis 17 x 22/1000 sheets, JCP G30).

4. Covers, if necessary, will be on either of two paper stocks:

a. Vellum finish (or antique finish) cover paper, white or colored, substance 50 lbs. (basis 20 x 26/1000 sheets, JCP L20).

b. Chemical wood index paper, white or colored, substance 110 lbs. (basis 25 1/2 x 30 1/2/1000 sheets, JCP K20).

5. Use of tabs is expensive and rarely necessary. First consideration should be given to the use of a contents page. Second choice should be bleed- edge index markers. If tabs must be used, they will be duplicated on one side only, on chemical wood index paper, white or colored, substance 110 lbs. (basis 25 1/2 x 30 1/2/1000 sheets); they will be angle cut and not die cut.

6. All duplicating will be in black ink. If other or additional color is required for a functional purpose, approval in writing must be obtained from the Langley Printing Management Officer (LPMO) through the Contracting Officer before preparation of final reproduction copy.

7. Text pages of all documents produced will be reproduced on both sides of sheet where feasible.

8. Binding will be by fastening with wire staples or stitches, either one in a corner or two in the binding margin. Documents too thick to staple or stitch will be produced in two or more volumes. Prong fasteners, binding screws, plastic combs, and spiral and similar wire fasteners add to production time and costs, and generally their use should be avoided.

9. Plastic protective sheets will not be used.

10. When hard-cover protection of a document is needed, the document will be drilled with three round 1/4 inch or 3/8 inch holes, 4 1/4 inches center-to-center, for insertion into standard 3-ring binders. Special stamped, printed or silk-screened binders shall not be used. A single corner staple or stitch or a band will be used to hold the document together until it is put into a binder.

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.				
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4. TITLE AND SUBTITLE Science Needs for Real-Time Adaptable Data Products From the Earth Observing System		5. FUNDING NUMBERS C NAS1-18676		
6. AUTHOR(S) Paul D. Try, Paul F. Twitchell, and Christopher R. Redder				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Science and Technology Corporation 101 Research Drive Hampton, VA 23666-1340		8. PERFORMING ORGANIZATION REPORT NUMBER STC-42518		
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13. ABSTRACT (Maximum 200 words) Advancing the understanding of the Earth system requires improved knowledge of the time-variant governing processes, and the knowledge of these processes often comes only from real-time observations of the changing variables as seen from space. The unpredictability of what is to be measured and at what rate requires flexibility in the observational capability. The Earth Observing System (EOS) will be a major source of observational data during the next 10- to 25-year timeframe. Consequently, to ensure the needed advances in the understanding of the Earth system, real-time onboard processing is concluded to be a critical need for EOS. (Provide an unclassified abstract not to exceed 200 words)				
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